
Smoking During Pregnancy Among Northwest Native Americans

ROBERT L. DAVIS, MD
STEVEN D. HELGERSON, MD, MPH
PATTI WALLER, MS

When this work was done, Dr. Davis was Medical Epidemiologist with the Washington State Department of Health in Olympia; he is now with the University of Washington Medical Center in Seattle. Ms. Waller is Research Investigator, Washington State Department of Health. Dr. Helgerson is Senior Epidemiologist of the Indian Health Service, Seattle.

The opinions expressed in this paper are those of the authors and do not necessarily reflect those of the Indian Health Service or the Washington State Department of Health.

Tearsheet requests to Robert L. Davis, MD, Division of General Pediatrics, RD-20, University of Washington Medical Center, Seattle, WA 98195.

Synopsis.....

There is little available information on the smoking habits of Native Americans. The authors used

data from the Washington State birth certificate to determine the prevalence of smoking during pregnancy among Native American mothers in Washington State.

From 1984 through 1988, 39.8 percent of all Native Americans smoked during their pregnancy. Smoking patterns during pregnancy differed markedly between Native Americans and whites according to maternal age and marital status. The smoking prevalence in Native Americans, adjusted for maternal age and marital status, was 1.3 times higher than that found in Washington State white women.

This is the first analysis of statewide smoking rates during pregnancy among Native Americans. The birth certificate can serve as a readily accessible and low cost surveillance system for populations such as Native Americans, who are otherwise difficult to study. Smoking intervention programs need to be targeted at Native Americans, and how their smoking patterns differ from those of the general population needs to be recognized.

SMOKING RATES in the Native American population vary widely by geographic location (1), but there is a lack of readily available population-based data with which to describe and monitor these differences. The smoking prevalence during pregnancy of Native Americans is of particular concern, since smoking during pregnancy is closely related to excess fetal and infant mortality (2).

Information on Native American smoking rates is absent from nationwide surveys such as the Adult Use of Tobacco Survey (3), the National Health Interview Survey (4), and the 1980 National Natality Survey (5). Although Native Americans are included in the Behavioral Risk Factor Survey Surveillance project, the number of Native Americans interviewed each year is small, due in part to their relatively low numbers and to the large proportion who do not have telephones (6). These problems have limited the ability of researchers to monitor the health practices of Native Americans during pregnancy.

Since 1984, the Washington State birth certificate has included the question, "Did mother smoke at

any time during pregnancy?" This information, routinely collected from hospitalized women before delivery, serves as a readily accessible surveillance mechanism to monitor the prevalence of risk factors, such as smoking during pregnancy. To evaluate the smoking prevalence during pregnancy among Native Americans, we analyzed information available on the Washington State birth certificate for the period 1984 through 1988.

Methods

All certificates for live births between January 1, 1984, through December 31, 1988, to Native American and white women ages 11 through 39 years were analyzed. Stillbirths, spontaneous abortions, or therapeutic abortions were not included in the analysis. Mother's race was determined by data on the birth certificate.

Crude smoking prevalences by race were determined and, using the direct method, were adjusted for maternal age and marital status. The chi-square analysis for linear trends was used to analyze

Table 1. Births and smoking prevalence during pregnancy among Native Americans and whites ages 11–39 years in Washington State, by age and marital status, 1984 through 1988

Age and marital status	Native Americans			Whites		
	Number births ¹	Number smoked	Percent smoked	Number births ¹	Number smoked	Percent smoked
Total	7,089	2,820	39.8	286,379	73,307	25.6
Married	3,004	966	32.2	237,586	48,228	20.3
Unmarried	4,085	1,854	45.4	48,793	25,079	51.4
Less than 20 years	1,640	620	37.8	27,347	11,579	42.3
20–24 years	2,513	1,059	42.1	81,791	26,835	32.8
25–29 years	1,771	683	38.6	96,276	22,298	23.2
30–34 years	883	347	39.3	61,549	9,891	16.1
35–39 years	282	111	39.4	19,416	2,704	13.9

¹ Excludes 17,147 white births and 533 Native American births for whom smoking status or marital status of mother was unknown.

trends among different age groups, and the Mantel-Haenzel chi-square was used to determine differences between races in age and marital status specific smoking prevalence. Adequate prenatal care was defined using a classification modified by Gortmaker (7). This method describes prenatal care as being adequate when there were nine or more prenatal visits and prenatal care began in the first trimester. The remaining combinations of prenatal visits and trimester of initial care were considered to be less than adequate.

Results

During the 5-year period, there were 7,089 births to Native American mothers and 286,379 births to white mothers ages 11–39 years for whom smoking status and marital status were known (table 1). The overall crude smoking prevalence during pregnancy among Native Americans was 39.8 percent. This prevalence was higher than the crude smoking prevalence during pregnancy of 25.6 percent found among white mothers. After adjustment for maternal age and marital status, the smoking prevalence for Native Americans (34.2 percent) was 1.3 times higher than the prevalence found for whites (25.9 percent).

There was little variation in smoking prevalence during pregnancy among the different age groups of Native American mothers (table 1). The lowest smoking prevalence, 37.8 percent in the under 20-year-old mothers, was only 4.3 percentage points lower than the highest smoking prevalence of 42.1 percent found in the 20–24-year-old mothers. In contrast, the smoking prevalence for whites, 13.9 percent among 35–39-year-old mothers, was more than 28 percentage points lower than the highest prevalence, 42.3 percent in the under 20-year-old mothers.

Table 2. Percentage of smoking prevalence during pregnancy among Native Americans and whites ages 11–39 years, by marital status and adequacy of prenatal care

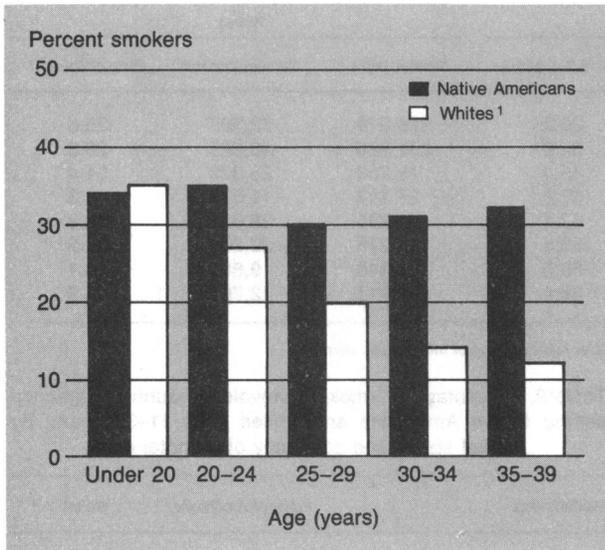
Marital status	Native Americans	Whites
Married:		
Adequate ¹	29.5	17.6
Less than adequate	39.4	35.1
Unmarried:		
Adequate ¹	43.9	49.2
Less than adequate	45.9	54.7

¹ Nine or more prenatal visits and prenatal care began in the first trimester.

Married Native American mothers smoked more frequently during pregnancy than married white mothers (table 1). When analyzed according to age groups, the percent of married Native American mothers who smoked during pregnancy remained essentially stable: 34.4 percent of those under 20 years old smoked and 31.9 percent of those 35–39 years old smoked (linear test for trend nonsignificant, fig. 1). There was a significant decline, however, in the smoking prevalence found in married white women. Among married white women less than 20 years old, 34.8 percent smoked during pregnancy, while only 11.8 percent of white women 35–39 years old smoked ($P < 0.01$, linear test for trend). The relative smoking prevalence in married Native American mothers 35–39 years old was 2.7 times (95 percent confidence interval [CI] 2.2, 3.4) that of the smoking prevalence in married white mothers of the same age.

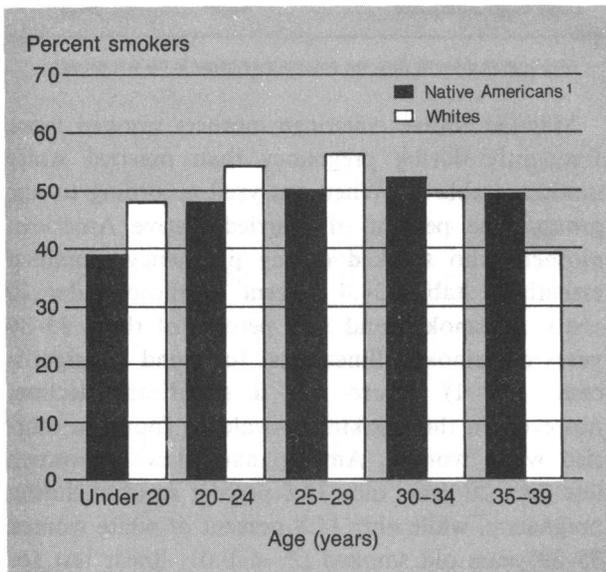
In contrast to married mothers, unmarried Native American mothers smoked less than unmarried white mothers in the age groups less than 30 years old (fig. 2). However, the smoking prevalence in unmarried Native American mothers increased with age ($P < 0.01$, linear test for trend), while the smoking prevalence in unmarried white mothers

Figure 1. Smoking during pregnancy among married Native Americans and whites, Washington State, 1984 through 1988



¹ $P < 0.01$, linear trend test.

Figure 2. Smoking during pregnancy among unmarried Native Americans and whites, Washington State, 1984 through 1988



¹ $P < 0.01$, linear trend test.

was lowest in the 35-39-year-old age groups. This finding resulted in unmarried Native American mothers ages 35-39 years old having a relative smoking prevalence 1.3 times (95 percent CI 1.0, 1.5) that of unmarried white mothers ages 35-39 years old.

Among unmarried Native American or white mothers, adequate prenatal care was associated with only a minor decrease in smoking prevalence (table 2). However, in married white women,

adequate prenatal care was associated with a 50 percent decrease in smoking prevalence during pregnancy (35.1 percent versus 17.6 percent). In married Native Americans, prenatal care was associated with a smaller 25 percent decrease in smoking prevalence, from 39.4 percent to 29.5 percent.

Discussion

This study relied on information from birth certificates to gauge the smoking habits of Native American women having a live birth in Washington State. Native American women had an adjusted smoking prevalence during pregnancy of 34.2 percent, which was 1.3 times greater than that found among white women. The overall crude smoking prevalence of 39.8 percent in more than 7,000 pregnancies is consistent with results from the 1989 Western Washington Native American Behavioral Risk Factor Survey. This survey of 53 Native American women found that 42 percent smoked during their last pregnancy (personal communication, M. Oberle, University of Washington School of Public Health and Community Medicine, Seattle).

One of the most important findings of this study is the elevated smoking prevalence during pregnancy, among both married and unmarried Native Americans, in the older age groups. This pattern was not seen among pregnant white women. In Washington State, smoking cessation strategies for pregnant white women might be most effectively aimed toward the younger age groups; in Native Americans, the focus should include pregnant women of all ages.

Birth certificate data have some important limitations. Information that can be derived from any State health department certificate is by definition State-specific, and therefore its applicability to other States is limited. According to the 1989 National Behavioral Risk Factor Survey, there was a greater than threefold difference in the smoking rates found in female Native Americans in the southwest States compared with female Native Americans of the northern plains region (personal communication, C. Warren, Centers for Disease Control, Atlanta, GA). For those States in regions outside of the Northwest with large Native American populations, it will be important to analyze State-specific birth certificate data to gauge smoking prevalences during pregnancy, rather than relying on the data reported in this paper. However, for any particular State, birth certificate information may be more reliable than telephone surveys

of the Native American population. On the average, more than 36 percent of Native American households served by the Indian Health Service are estimated to be without a telephone, compared with 7.1 percent of the households in the general U.S. population (6).

In 1987, a random sample of 765 hospital records were reviewed to assess the validity of birth certificate information in Washington State (personal communication, P. Starzyk, Washington State Center for Health Statistics, Washington State Department of Health). In that sample, the mother's hospital record agreed with the birth certificate information more than 96 percent of the time with respect to mother's smoking status during pregnancy and more than 99 percent of the time with respect to maternal marital status during pregnancy.

The birth certificate data we analyzed provided no information on number of cigarettes smoked per day or cessation rates during pregnancy. Data from the 1989 Western Washington Native American Behavioral Risk Factor Survey suggested that nonpregnant Native American women smoked less heavily than their non-Native American counterparts, and it may be that this difference also exists among those who become pregnant. However, among Native Americans who smoke during pregnancy, it is not currently known how many cigarettes are consumed daily, what proportion of Native Americans quit smoking during pregnancy, or whether Native Americans differ from whites in this regard. Further research is needed to provide the answers to these questions.

It is sobering that even among those who receive

adequate prenatal care the smoking prevalence among married Native Americans remains substantially higher than that among married whites. Other barriers to smoking cessation among Native Americans such as lack of education, cultural practices, or availability of other medical care may also play an important role in the differences found in this study. Research is needed to further identify barriers that exist in the Native American population even with adequate prenatal care, and to develop the appropriate strategies to reduce smoking rates during pregnancy for both married and unmarried Native Americans.

References

1. Indian Health Service facilities become smoke-free. *MMWR* 36: 348-350, July 10, 1987.
2. McIntosh, I. D.: Smoking and pregnancy: attributable risks and public health implications. *Can J Public Health* 75: 141-148, March/April 1984.
3. Centers for Disease Control, Center for Chronic Disease Prevention and Health Promotion: Tobacco use in 1986: methods and basic tabulations from Adult Use of Tobacco Survey. Rockville, MD, 1990.
4. Novotny, T. E., et al.: Smoking by blacks and whites: socioeconomic and demographic differences. *Am J Public Health* 78: 1187-1189, September 1988.
5. Prager, K., et al.: Smoking and drinking behavior before and during pregnancy of married mothers of live-born infants and stillborn infants. *Public Health Rep* 99: 117-127, March-April 1984.
6. Public Health Service, Indian Health Service: Regional differences in Indian health 1990. Rockville, MD, 1990.
7. Gortmaker, S. L.: The effects of prenatal care upon the health of the newborn. *Am J Public Health* 69: 653-660 (1979).